D g n o (B)
1 = 1 Ω, 2 = 1 Ω

NPN Transistors with Monolithic Bias

Table 1. ORDERING INFORMATION

Device	Part Marking	Package	Shipping†
SMUN2230T1G*	8G	SC−59 (Pb−Free)	3000 / Tape & Reel
MMUN2230LT1G, NSVMMUN2230LT1G*	A8G	SOT−23 (Pb−Free)	3000 / Tape & Reel
MUN5230T1G	8G	SC−70/SOT−323 (Pb−Free)	3000 / Tape & Reel
DTC113EET1G	7Q	SC−75 (Pb−Free)	3000 / Tape & Reel
DTC113EM3T5G, NSVDTC113EM3T5G*	7A	SOT−723 (Pb−Free)	8000 / Tape & Reel

DISCONTINUED (Note 1)

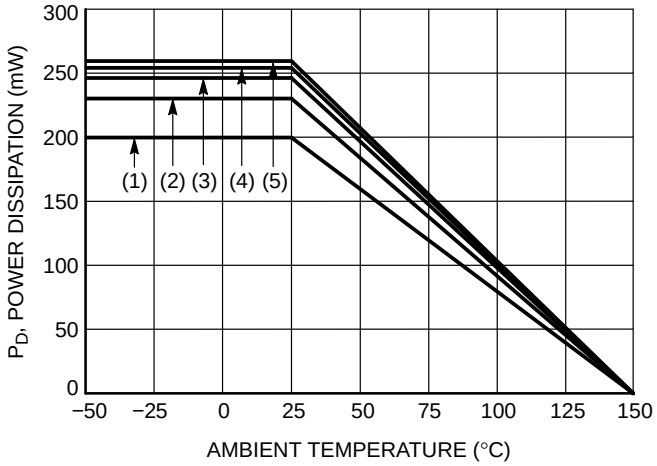
MUN2230T1G	8G	SC−59 (Pb−Free)	3000 / Tape & Reel
NSBC113EF3T5G	D (180°)**	SOT−1123 (Pb−Free)	8000 / Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

*S and NSV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable.

** (xx°) = Degree rotation in the clockwise direction.

1. **DISCONTINUED:** These devices are not recommended for new design. Please contact your **onsemi** representative for information. The most current information on these devices may be available on www.onsemi.com.



(1) SC−75 and SC−70/SOT323; Minimum Pad
(2) SC−59; Minimum Pad
(3) SOT−23; Minimum Pad
(4) SOT−1123; 100 mm^2, 1 oz. copper trace
(5) SOT−723; Minimum Pad

Figure 1. Derating Curve

Table 2. THERMAL CHARACTERISTICS

Characteristic		Symbol	Max	Unit
THERMAL CHARACTERISTICS (SC−59) (MUN2230)				
Total Device Dissipation T_A = 25°C Derate above 25°C	 (Note 2) (Note 3) (Note 2) (Note 3)	P_D	 230 338 1.8 2.7	 mW mW/°C
Thermal Resistance, Junction to Ambient	(Note 2) (Note 3)	$R_{\theta JA}$	540 370	°C/W
Thermal Resistance, Junction to Lead	(Note 2) (Note 3)	$R_{\theta JL}$	264 287	°C/W
Junction and Storage Temperature Range		T_J, T_{stg}	−55 to +150	°C
THERMAL CHARACTERISTICS (SOT−23) (MMUN2230L)				
Total Device Dissipation T_A = 25°C Derate above 25°C	 (Note 2) (Note 3) (Note 2) (Note 3)	P_D	 246 400 2.0 3.2	 mW mW/°C
Thermal Resistance, Junction to Ambient	(Note 1) (Note 3)	$R_{\theta JA}$	508 311	°C/W
Thermal Resistance, Junction to Lead	(Note 2) (Note 3)	$R_{\theta JL}$	174 208	°C/W
Junction and Storage Temperature Range		T_J, T_{stg}	−55 to +150	°C
THERMAL CHARACTERISTICS (SC−70/SOT−323) (MUN5230)				
Total Device Dissipation T_A = 25°C Derate above 25°C	 (Note 2) (Note 3) (Note 2) (Note 3)	P_D	 202 310 1.6 2.5	 mW mW/°C
Thermal Resistance, Junction to Ambient	(Note 2) (Note 3)	$R_{\theta JA}$	618 403	°C/W
Thermal Resistance, Junction to Lead	(Note 2) (Note 3)	$R_{\theta JL}$	280 332	°C/W
Junction and Storage Temperature Range		T_J, T_{stg}	−55 to +150	°C
THERMAL CHARACTERISTICS (SC−75) (DTC113EE)				
Total Device Dissipation T_A = 25°C Derate above 25°C	 (Note 2) (Note 3) (Note 2) (Note 3)	P_D	 200 300 1.6 2.4	 mW mW/°C
Thermal Resistance, Junction to Ambient	(Note 2) (Note 3)	$R_{\theta JA}$	600 400	°C/W
Junction and Storage Temperature Range		T_J, T_{stg}	−55 to +150	°C
THERMAL CHARACTERISTICS (SOT−723) (DTC113EM3)				
Total Device Dissipation T_A = 25°C Derate above 25°C	 (Note 2) (Note 3) (Note 2) (Note 3)	P_D	 260 600 2.0 4.8	 mW mW/°C

2. FR−4 @ Minimum Pad.
3. FR−4 @ 1.0 x 1.0 Inch Pad.
4. FR−4 @ 100 mm^2, 1 oz. copper traces, still air.
5. FR−4 @ 500 mm^2, 1 oz. copper traces, still air.

Table 2. THERMAL CHARACTERISTICS

Characteristic		Symbol	Max	Unit
THERMAL CHARACTERISTICS (SOT−723) (DTC113EM3)				
Thermal Resistance, Junction to Ambient	(Note 2) (Note 3)	$R_{\theta JA}$	480 205	°C/W
Junction and Storage Temperature Range		T_J, T_{stg}	−55 to +150	°C
THERMAL CHARACTERISTICS (SOT−1123) (NSBC113EF3)				
Total Device Dissipation T_A = 25°C Derate above 25°C	 (Note 4) (Note 5) (Note 4) (Note 5)	P_D	 254 297 2.0 2.4	 mW mW/°C
Thermal Resistance, Junction to Ambient	(Note 4) (Note 5)	$R_{\theta JA}$	493 421	°C/W
Thermal Resistance, Junction to Lead	(Note 4)	$R_{\theta JL}$	193	°C/W
Junction and Storage Temperature Range		T_J, T_{stg}	−55 to +150	°C

2. FR−4 @ Minimum Pad.
3. FR−4 @ 1.0 x 1.0 Inch Pad.
4. FR−4 @ 100 mm^2, 1 oz. copper traces, still air.
5. FR−4 @ 500 mm^2, 1 oz. copper traces, still air.

Table 3. ELECTRICAL CHARACTERISTICS (T_A = 25°C, unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit

TYPICAL CHARACTERISTICS
MUN2230, MMUN2230L, MUN5230, DTC113EE, DTC113EM3, NSBC113EF3

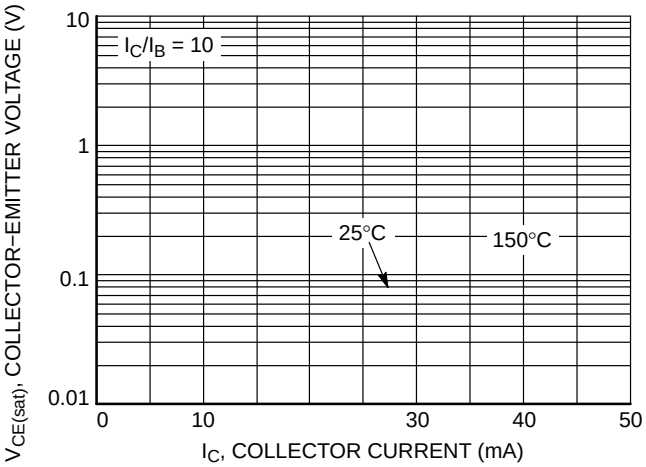


Figure 2. $V_{CE(sat)}$ vs. I_C

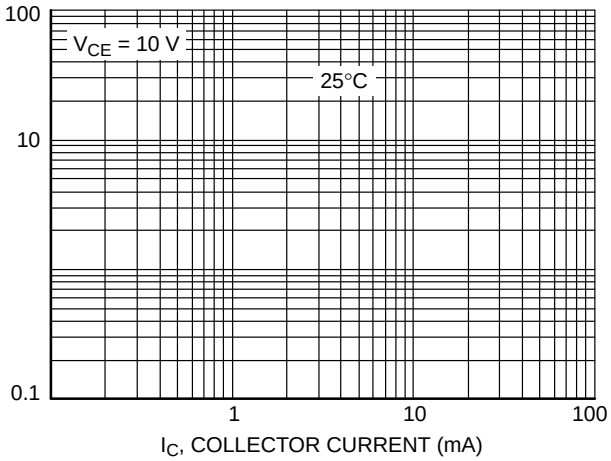


Figure 3. DC Current Gain

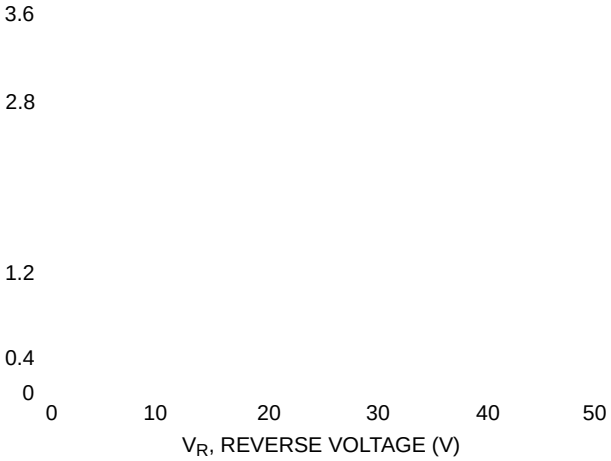


Figure 4. Output Capacitance

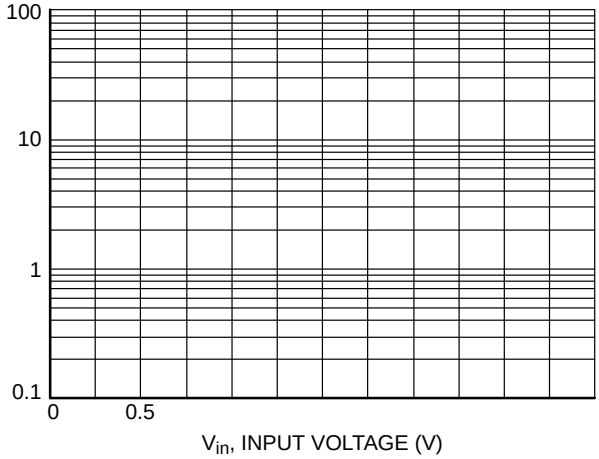


Figure 5. Output Current vs. Input Voltage

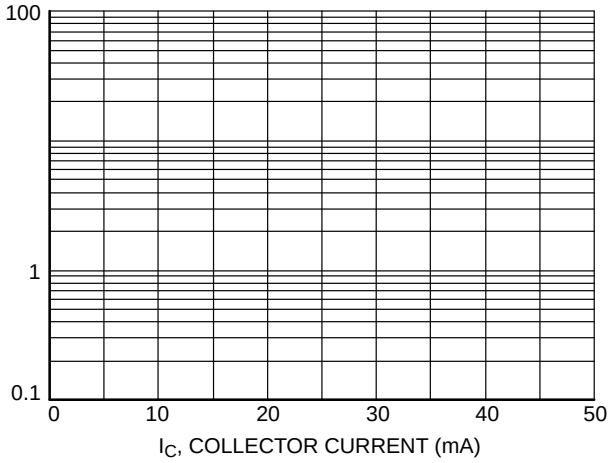
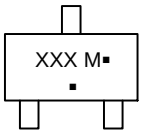
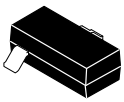


Figure 6. Input Voltage vs. Output Current

SC−59−3 2.90x1.50x1.15, 1.90P
CASE 318D
ISSUE J

DATE 15 FEB 2024





SCALE 4:1

SOT 23 (TO 236) 2.90x1.30x1.00 1.90P
CASE 318
ISSUE AU

DATE 14 AUG 2024

SOT 23 (TO 236) 2.90x1.30x1.00 1.90P
CASE 318
ISSUE AU

DATE 14 AUG 2024

STYLE 6:
PIN 1. BASE
2. EMITTER
3. COLLECTOR

STYLE 7:
PIN 1. EMITTER
2. BASE
3. COLLECTOR

STYLE 8:
PIN 1. ANODE
2. NO CONNECTION
3. CATHODE

STYLE 9:
PIN 1. ANODE
2. ANODE
3. CATHODE

STYLE 10:
PIN 1. DRAIN
2. SOURCE
3. GATE

STYLE 11:
PIN 1. ANODE
2. CATHODE
3. CATHODE−ANODE

STYLE 12:
PIN 1. CATHODE
2. CATHODE
3. ANODE

STYLE 13:
PIN 1. SOURCE
2. DRAIN
3. GATE

STYLE 14:
PIN 1. CATHODE
2. GATE
3. ANODE

STYLE 15:
PIN 1. GATE
2. CATHODE
3. ANODE

STYLE 16:
PIN 1. ANODE
2. CATHODE
3. CATHODE

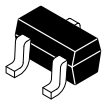
STYLE 17:
PIN 1. NO CONNECTION
2. ANODE
3. CATHODE

STYLE 18:
PIN 1. NO CONNECTION
2. CATHODE
3. ANODE

STYLE 19:
PIN 1. CATHODE
2. ANODE
3. CATHODE−ANODE

STYLE 22:
PIN 1. RETURN
2. OUTPUT
3. INPUT

STYLE 23:
PIN 1. ANODE
2. ANODE
3. CATHODE
3.

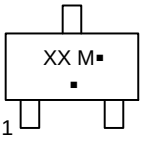


SCALE 4:1

SC−70 (SOT−323)
CASE 419
ISSUE R

DATE 11 OCT 2022

GENERIC
MARKING DIAGRAM



XX = Specific Device Code
M = Date Code
▪ = Pb−Free Package

*This information is generic. Please refer to device data sheet for actual part marking. Pb−

STYLE 1:
CANCELLED

STYLE 2:
PIN 1. ANODE
2. N.C.
3. CATHODE

STYLE 3:
PIN 1. BASE
2. EMITTER
3. COLLECTOR

STYLE 4:
PIN 1. CATHODE
2. CATHODE
3. ANODE

STYLE 5:
PIN 1. ANODE
2. ANODE
3. CATHODE

STYLE 6:
PIN 1. EMITTER
2. BASE
3. COLLECTOR

STYLE 7:
PIN 1. BASE
2. EMITTER
3. COLLECTOR

STYLE 8:
PIN 1. GATE
2. SOURCE
3. DRAIN

STYLE 9:
PIN 1. ANODE
2. CATHODE
3. CATHODE-ANODE

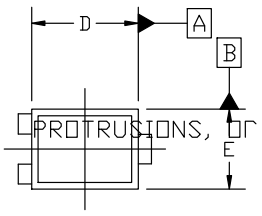
STYLE 10:
PIN 1. CATHODE
2. ANODE
3. ANODE-CATHODE

STYLE 11:
PIN 1. CATHODE
2. CATHODE
3. CATHODE

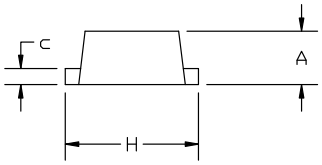
RECOMMEND

SOT−1123 0.80x0.60x0.37, 0.35P
CASE 524AA
ISSUE D

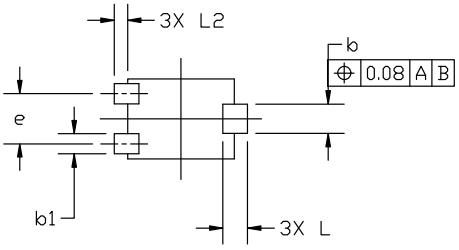
DATE 18 JAN 2024



TOP VIEW



SIDE VIEW



BOTTOM VIEW

NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2018.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. MAXIMUM LEAD THI , ASH,

 < GATE BURRS.

MILLIMETERS			
DIM	MIN	NOM	MAX
A	0.34	0.37	0.40
b	0.15	0.22	0.2
			´5
e	0.35	0.38	0.40
H	0.950	1.000	1.050
L	0.185 REF		
L2	0.05	0.10	0.15

GENERIC
MARKING DIAGRAM*

X = Specific Device Code
M = Date Code

*This information is generic. Please refer to device data sheet for actual part marking. Pb−Free indicator, “G” or microdot “▪”, may or may not be present. Some products may not follow the Generic Marking.

RECOMMENDED
MOUNTING FOOTPRINT

*

STYLE 1:
PIN 1. BASE
2. EMITTER
3. COLLECTOR

STYLE 2:
PIN 1. ANODE
2. N/C
3. CATHODE

STYLE 3:
PIN 1. ANODE
2. ANODE
3. CATHODE

STYLE 4:
PIN 1. CATHODE
2. CATHODE
3. ANODE

STYLE 5:
PIN 1. GATE
2. SOURCE
3. DRAIN

SOT−723 1.20x0.80x0.50, 0.40P

GENERIC MARKING